Complexion of the Complex: Engineering Course Environment Complexity Trends

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\section*{Background}
- Course complexity linked to higher quality graduates\textsuperscript{1}
- Course complexity refers to Wide Array of Teaching Practices and Strategies (WATPS)
- Pandemic demanded change in WATPS used in classrooms\textsuperscript{2}
- WATPS includes learning environment aspects
- Two aspects of a WATPS, (1) Instructor Rapport and (2) Transparency and Fairness

\section*{Purpose}
1. Detect change in course complexity scores for Instructor Rapport; Transparency and Fairness
2. If present, look for trends surrounding pandemic in course complexity scores

\section*{Methods}
\textbf{Data:} Three sophomore level course syllabi within a certain engineering program at a midwestern R1 university

\textbf{Collection Period:} Semesters S19 - S23, Courses A and B offered spring only, Course C offered fall only (no data available for S19 or COVID Update)

\textbf{Analysis:} Deductively coded for ABET standards and environment factors

\textbf{Interrater Reliability:} Coders established minimum of 80\% simple agreement

\section*{Results}

\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline
\textbf{Course Type} & ABET1 (STEM) & ABET2 (Design) & ABET6 (Exp/Data) & ABET3 (Comm) & ABET4 (Ethics) & ABET5 (Team/Lead) & ABET7 (Learn.Strat.) \\
\hline
Course A & S19-S23 & 4.00 & 0.67 & 0.89 & 0.72 & 0.72 & 0.67 \\
Course B & S19-S23 & 3.41 & 0.63 & 0.30 & 0.67 & 1.07 & 0.74 & 0.30 \\
Course C & F19-F22 & 2.50 & 0.25 & 2.75 & 2.25 & 0.00 & 2.00 & 0.00 \\
\hline
\end{tabular}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig1.png}
\caption{Instructor Rapport Scores Over Academic Years S19 - S23}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig2.png}
\caption{Transparency and Fairness Scores Over Academic Years S19 - S23}
\end{figure}

\section*{Discussion}
- ABET1 scores: Course complexity linked to higher quality graduates
- ABET2 scores: Course complexity refers to Wide Array of Teaching Practices and Strategies (WATPS)
- ABET6 scores: Pandemic demanded change in WATPS used in classrooms
- ABET3 scores: Two aspects of a WATPS, (1) Instructor Rapport and (2) Transparency and Fairness

\section*{Conclusion}
All instructors did not improve environmental aspects in reaction to the pandemic
- Each course demonstrates unique trends
- Course complexity scores average to “Normal/Traditional” (3-5)
- Maximum scores never exceed “Some” (11-15)
- Scores do not reach “A Lot” (16+)
- General need for greater attention to classroom environment remains

\section*{Future Studies}
- Studies with increased sampling (large n) to look for trends across variety of engineering courses
- Studies to focus on how to sustain increase in complexity
- Studies on increasing classroom environment aspects (why are they not prevalent)
- Understand why some instructors react to disruption by increasing and some by decreasing classroom environment complexity

\section*{References}

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